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SUPERSEDING
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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION SPECIFICATION

1. SCOPE

1.1 Scope.- This specification defines a set of electronically controlled line switching equipment provided to the FAA NAS system primarily for A/G communications lines herein called the LASS switch. The LASS switch will be used primarily to switch the pair of dedicated redundant circuits which connect the ARTCC radio control equipment to the RCAG radio control equipment; although, it may also be used with any facility having leased TELCO circuits. The equipment, features, options, and ARTCC-to-RCAG relationships are stated herein. This specification, as compiled, will be used for leased services only. This specification defines the features that may be included in the LASS switch and will be referred to in the order. For standardization in the LASS switch at all facilities only features described herein can be ordered without prior Washington headquarters coordination and approval.

2. APPLICABLE DOCUMENTS.- The following documents and amendments thereto form a part of this specification and are applicable to the extent specified herein.

2.1 Federal Aviation Administration standards.-

FAA-STD-001a	Color and Texture of Finishes for National Airspace System Equipment

2.2 Federal Aviation Administration handbooks.-

4441.3	Procedures for Leasing Commercial Communication Services
4441.9	Practices Concerning Leased Telecommunication Services

SM P 6000.4 Maintenance of Control Lines

6500.5 Maintenance of Air/Ground Communication Facilities

2.3 Federal Aviation Administration specifications.-

FAA-S-1142a Voice Frequency Multi-Tone Remote Control Circuits

FAA-E-163b Rack, Cabinet and Open Frame Types

FAA-E-2431 Voice Frequency Signalling Systems (RCAG)

FAA-E-2486 Headset, Acoustic Tube

(Copies of FAA Handbooks may be obtained from the Federal Aviation Administration, Public Document Inspection Facilities, AHQ-405, Washington, D. C., 20591. Requests for FAA specifications should be marked for the attention of AAF-110. Requests should fully identify material desired, i.e., specification number, handbook number, dates, amendment numbers, etc. Also, the request should state what use will be made of these documents.)

3. REQUIREMENTS

3.1 General requirements.- The contractor shall provide all engineering, management, services, and materials necessary to design, fabricate, test, deliver, install, and maintain the equipment defined by this specification. The equipment required shall provide for automatically switching of the redundant/diverse routed lines associated with the system. The equipment will be provided with all required features as defined herein and those options as specified in the order. The Government will provide building facilities and services as specified herein.

3.1.1 Equipment and services to be furnished by the contractor.- The LASS system with all of the essential features and optional features, when specified in the contract, shall be provided by the contractor when ordered by the Government. Leasing of the LASS system shall be in complete compliance with FAA Handbook 4441.3, Procedures for Leasing Commercial Communications Services, FAA Handbook 4441.9, Practices Concerning Leased Telecommunications Services, and other current, appropriate Government regulations and tariffs where applicable. Provision shall be made by the contractor to assure that any failure of circuitry related to one(1) LASS switch shall **not totally disable any other LASS switch. Additionally,** performance of LASS systems shall be required to comply with established Government requirements and shall in no manner derogate the performance of the Government equipment connected thereto. Those LASS switches associated with the A/G communications system shall not derogate the performance of the equipment described in Specification FAA-E-2431.

3.1.2 Equipment and services to be furnished by the Government.- The Government will provide the following.

3.1.2.1 Building facilities.-

3.1.2.1.1 Space.- Floor space will be reserved for the equipment. In the ARTCC, this space will be in an isolated area reserved for leased TELCO equipment. Normally, a ceiling height of 12'6" will be provided at the facility. At those facilities where the normal height cannot be feasibly provided, a minimum height of 8'6" will be provided. This will provide for the installation of seven(7) feet WECO equipment racks provided by TELCO. At the RCAG, space will be provided for mounting the LASS equipment packages provided by TELCO. The packages which provide for the switching shall have dimensions nominally 36" H x 23" W x 12" D. The packages may be wall mounted or on the floor as an option of the Government. In those cases where large quantities of LASS switches are required at an RCAG facility the Government may optionally request rack mounted equipment packages as provided in the ARTCC. Floor space will be provided for these racks in the equipment room. The use of open racks shall be limited to cases of absolute necessity. Access to the racks will be provided. Front entry access only will be provided for the wall or floor mounted packages. Front and rear entry access will be provided when rack mounted equipment is required at the facility.

3.1.2.1.2 Maintenance equipment.- The Government will provide space to mount the required test, maintenance and monitoring devices included in the system. These devices include the status lamp displays, the control panels, the test jacks and the telephone instrument. Normally, this space will be provided in the 19" equipment rack (See Figure 1) which comply with Specification FAA-E-163b.

3.1.2.1.2.1 ARTCC facilities.- At the ARTCC, space will be provided by the Government for mounting the status lamp displays in 19" equipment racks which comply with Specification FAA-E-163b within the FAA equipment room. The location will be selected by the Government at the facility. The control panel shall be an integral part of the status lamp display. The Government will provide space for the mounting of the test jacks within close proximity of the control panels/lamp displays. Optionally, the Government will provide space for mounting the control panels/lamp displays in the SMMC. The dimensions of the required space is included herein under the paragraph defining the display/control panel and the test jacks. To facilitate all LASS system maintenance, this associated control and display equipment should be mounted close to existing jack fields. In those cases where this is not possible, it is recommended that the LASS test jacks be located directly under its associated control panel/ lamp display. The Government will provide space for mounting the standard telephone instrument for maintenance communications equipment. The location will be selected by the Government and specified in the order.

3.1.2.1.2.2 RCAG facilities.- The Government will provide space for mounting the control panels in 19" equipment racks which comply with FAA-E-163b at the RCAG sites within the equipment room. The lamp displays shall be an integral part of the control panel. The Government will provide space for mounting the LASS test jacks in 19" equipment racks. The space will be provided in existing jack field racks if it is available. In those cases where this is not possible, the test jacks space will be

provided directly below the associated control panel/lamp displays. Space will be provided by the Government for the telephone instrument and associated circuitry that has been selected. The locations of the equipment racks will be selected by the Government and specified in the order. Optionally the D/C Panel and Test jacks may be mounted in wall cabinets provided by the serving company.

3.1.2.1.3 Lighting.- Lighting will be provided by the Government in the equipment room. This lighting will be adequate for normal installation and maintenance activities. Any special lighting requirements will be the responsibility of the local telephone company.

3.1.2.1.4 Temperature.- Building nominal temperature will be 72°F (22°C) with a possible temperature variation between 50°F (10°C) and 104°F (40°C).

3.1.2.1.5 Humidity.- Building relative humidity will vary between 10% and 95%.

3.1.2.1.6 Building access.- The Government will provide building access to local telephone company installation and maintenance personnel, subject to Government security regulations.

3.1.2.1.7 AC Power.- In all cases the Government will provide the required primary AC power for the LASS equipment. At the ARTCC AC power has been provided for usage with other leased systems installed therein. If additional AC power provisions are required to accommodate the LASS equipment the Government will provide the necessary AC power to the distribution panels. At the RCAG sites the Government will provide 120 VAC, 3-Wire service for the LASS equipment. In all cases this electrical service will be supplied from the essential load bus and will be protected by Government provided 15 ampere circuit breakers. The TELCO representative shall inform the Government of the total number of switching packages to be installed at a facility and the total electrical current requirements of the switching systems. The Government will provide the electrical service through Government owned conduits. The AC circuits will be provided backup power from the Government owned emergency backup generators.

3.1.2.1.8 Cable runs.- The LASS switch will require cable runs for routing all cables associated with switch circuits, status lamps, control panels and line test jacks. The Government will provide the required cable racks, cable trays or conduits for all cables of the LASS system located external to the building space provided for TELCO equipment. At the ARTCC, the Government will provide all cable trays or racks except those located within the TELCO equipment room. At the RCAG, the Government will provide cable racks or conduits from the building cable terminations to the telephone cabinets. In all cases, the local TELCO organization shall provide all required wiring and connections up to the demarcation strip.

3.1.2.1.9 Demarcation Strip.- The Government will provide a demarcation strip (Handbook 4441.9). The Government will select its location. Installation and connection will be in compliance with that handbook.

3.1.2.2 Facility termination chart.- Intentionally left blank.

3.2 Definitions.-

3.2.1 A/G.- Air to ground, communications paths between the air traffic controller and the aircraft.

3.2.2 ARTCC.- Air route traffic control center which houses the equipment and personnel used in controlling en route air traffic.

3.2.3 AT&T.- American Telephone and Telegraph Company.

3.2.4 Button.- A knob attached to an electrical switch.

3.2.5 BTL.- Bell Telephone Laboratories.

3.2.6 Circuit.- Synonymous with line, however, may include other telephone equipment or Government owned equipment.

3.2.7 Diverse.- To be routed so as to have a path which is different from another.

3.2.8 FAA.- Federal Aviation Administration.

3.2.9 Key.- Synonymous with button.

3.2.10 Line.- Synonymous with trunk.

3.2.11 NAS.- National Airspace System.

3.2.12 Optional.- As applied to this specification, those features listed and described herein which shall be supplied to the Government only when specified in the order.

3.2.13 PTT.- Push-to-talk, a function performed by depressing a button which may be used to originate a voice transmission.

3.2.14 RCAG.- Remote center air ground, the facility that houses the radio receivers/transmitters for A/G communication.

3.2.15 Redundant.- Dual lines originating at a common near-end location and terminating at a common far-end location.

3.2.16 SMMC.- System Maintenance Monitor Console, a console provided to centrally monitor the various subsystems of the ARTCC.

3.2.17 Switch, electrical.- A device which makes, breaks or changes an electrical connection.

3.2.18 TELCO.- The local telephone company or serving company.

3.2.19 Telephone instrument.- A headset or handset used by maintenance personnel for the voice channel.

3.2.20 Trunk.- A two or four wire leased telephone service connecting at least two points.

3.2.21 WECO.- Western Electric Company.

3.3 LASS features.- The LASS switch shall provide the following features/ functions:

(a) Access to two(2) redundant/diverse routed circuits to serve the ARTCC and the RCAG. One route to be called the primary and the other the alternate or spare circuit.

(b) Continuous monitoring of the operational status and availability of both circuits.

(c) Automatic sensing of any failure in either of the circuits.

(d) Automatic transfer from a failed primary circuit to a good alternate circuit, priority shall be assigned to primary.

(e) Automatic restore from alternate to primary when failed conditions are no longer sensed on an unlocked primary line.

(f) Manual transfer capability to allow the manual selection of the primary or alternate circuit as the operating circuit.

(g) Automatic positive locking on the manually selected circuit.

(h) Control panels to provide the facilities for the manually controlled circuit selection and status indications.

(i) Status lamp to visually indicate the failed circuits and locked circuits.

(j) Audible alarm to indicate the failed circuits. Included is a switch to silence this alarm.

(k) Test jacks for circuit testing.

(l) Maintenance voice communication channel with an audible alarm, visual alarm and the telephone instrument.

3.3.1 Essential features.- The following features and functions shall be provided to each switch on a non-optional basis. Each of these features shall be provided to the basic system. The use of each feature in any LASS system shall be an option of the Government. The non-use of any feature will not necessarily reduce the cost of the system.

Feature/Function	Paragraph
Access to Line Circuits	3.3.1.1
Circuit Monitoring Feature	3.3.1.2
Circuit Sensing Feature	3.3.1.3

Feature/Function	Paragraph
Circuit Transfer	3.3.1.4
Automatic Transfer Feature	3.3.1.4.1
Manual Transfer Feature	3.3.1.4.2
Manual Circuit Lock Feature	3.3.1.5
Display/Control Panel	3.3.1.6
Manual Control	3.3.1.6.1
Status Lamps	3.3.1.6.2
Alarm Cut-Off	3.3.1.6.3
Audible Alarm	3.3.1.7
Test Jacks	3.3.1.8
Maintenance Voice Channel Feature	3.3.1.9

3.3.1.1 Access to lines - The local telephone company shall provide normal access on a non-optional basis to two(2) pair of redundant/diverse routed lines for ARTCC and RCAG remote radio receiver/transmitter control functions. One line shall be specified as primary while the other line shall be the alternate (See Figure 2). One line shall be operating while the other line shall be standby. Each of these lines shall be in complete compliance with Specification FAA-S-1142a. The Government shall be provided access to either of these circuits through the LASS switch alternately, both automatically and manually, for the required termination into Government provided radio equipment at the demarcation strip. The redundant/diverse routed lines in conjunction with the LASS switch shall be referred herein as a LASS system. The LASS system shall provide simultaneous interfaces at the ARTCC and the RCAG to the same circuit which has been selected. The operating line shall terminate in the demarcation strip. Additionally, the standby line shall be terminated in the test jacks. The LASS system shall in no way degrade the signals or voice frequencies required for normal operation of the radio system beyond those limits defined in Specification FAA-S-1142a, the 2295 ± 125 Hz point shall be an exception.

3.3.1.2 Circuit monitoring feature.- The LASS system shall be provided with a continuous audible tone, whose frequency shall nominally be 2295 Hz, hereafter called the pilot tone. The pilot tone shall normally appear to both the primary and alternate lines in conjunction with and regardless of other signals that the Government may utilize in the system.

The pilot tone shall be detected by the far-end terminations of the LASS system to provide the continuous monitoring capability. Any failure of the pilot tone in one(1) LASS switch shall in no manner effect another LASS switch. The pilot tone shall be filtered within the LASS system and shall not appear in those signals provided to the demarcation strip for Government usage. The filters provided to the LASS system shall attenuate a band of frequencies nominally 250 Hz wide and shall have a nominal center frequency at 2295 Hz. The filter shall attenuate the band of frequencies a minimum 6dB below the predetermined level expected at these frequencies on non-LASS equipped lines as defined in Specification FAA-S-1142a. The filters utilized in air to ground communications shall not derogate those required signals defined in FAA-E-2431.

3.3.1.3 Circuit sensing feature.- The LASS system shall be provided circuitry to sense and detect failures independently on both primary and alternate circuits associated with the line switching equipment as described herein. In those cases when the sensing circuitry detects a failed primary operating circuit and a non-failed condition on an alternate standby circuit an automatic transfer shall occur. When the sensing circuitry detects a predetermined restore level on a failed primary line and that line is not locked out, an automatic RESTORE shall occur. In all cases when a failed circuit is detected by the sensing circuit both the visual alarm and the aural alarm shall occur. Additionally, when the LASS switch is defective, the sensing circuit shall cause the alarm function to occur.

3.3.1.3.1 Circuit loss failure.- The sensing circuit shall independently detect circuit loss failures on both the alternate and primary lines. A circuit loss failure is defined as that condition wherein the pilot tone which is normally measured at the receive end is absent or the power level thereof has decreased to a value equal to or less than 16db nominally below the level (Ø TLP) of the same pilot tone measured at the send end of the associated line. The loss failure shall exist on a circuit until the pilot tone level is nominally 6db above the failure level for 250 milliseconds.

3.3.1.3.2 Pilot tone failure.- The LASS system shall be provided sensing circuitry to independently detect a failure due to the loss of the pilot tone on either the primary or alternate lines. In all cases, the absence of the pilot tone shall constitute a line failure. In these cases where the pilot tone generator fails within a LASS switch, aural or visual indications shall occur at the display/control panels. In all cases, the failure of a pilot tone generator associated with one LASS switch shall in no manner effect another LASS switch commonly located at a facility. The pilot tone failure shall exist on a circuit until the pilot tone level is nominally 6db above the circuit loss failure level for 250 milliseconds.

3.3.1.4 Circuit transfer.- The primary line described in paragraph 3.3.1.1 shall normally be construed to be the operating line while the alternate line shall normally be the standby. The LASS system shall provide the circuitry necessary for transferring the termination of the operating line and the standby line. When a transfer occurs, the operating/standby line relationship shall be reversed. This circuit transfer may be called line switching. The LASS system shall provide circuit transfers by both the electronically controlled automatic transfer feature described in paragraph 3.3.1.4.1 and the manual transfer feature described in paragraph 3.3.1.4.2 (See Figure 3). The circuit transfer feature shall be provided on a non-optional basis.

3.3.1.4.1 Automatic circuit transfer feature.- The LASS switch shall be provided a pilot tone (paragraph 3.3.1.2), a sensing circuit (paragraph 3.3.1.3) and the necessary interconnecting circuitry to provide the Government with a normal transfer of the circuits as described above in cases of failure (paragraph 3.3.1.3) of the primary line. The LASS system shall automatically and simultaneously transfer both the ARTCC terminations and the RCAG terminations of the circuits in those cases of line failures away from the controlling facility. However, in those line failures away from the controlled facility the transfer shall be only in the controlling facility receive line of a four wire system. The time period required for automatic transfer of circuits shall be less than 25 milliseconds. This time period shall begin at the instant a failure is occurs and end at the time the line transfer is completed at the facilities. Additionally, the automatic circuit transfer feature shall provide a line transfer, alternate to primary (RESTORE) at the time that the sensing circuits detects a non-failed condition on the primary circuit unless the alternate circuit is locked (paragraph 3.3.1.5) as the operating circuit. The time required for RESTORE shall be as specified in those paragraphs defining the failure types detected by the LASS system. The automatic transfer feature shall automatically transfer to the primary line if both lines are in failed condition, and the primary line is not locked out. This feature shall be provided on a non-optional basis.

3.3.1.4.2 Manual circuit transfer feature.- The LASS system shall be provided with two(2) locking pushbuttons, with indicator lamps included called manual transfer/lock pushbuttons. A pushbutton shall be provided for the primary line and another provided for the alternate line. Depressing the manual transfer/lock pushbutton associated with the primary line shall cause the primary circuit at both facilities to become or remain locked as the operating circuit regardless of the status of either line. The primary lock indicator shall become "STEADY ON" at that facility and the alternate failed indicator shall become "STEADY ON" on the display panels at both facilities. The alternate line shall be positively disabled. Only the facility that manually transfers a line shall have the capability of releasing that line. The automatic transfer feature shall be positively disabled when a circuit has been transferred and locked manually. Depressing the same pushbutton again shall release the lock on the primary line, cause the primary lock indicator to be "OFF" and cause the alternate failed indicator to be "OFF." Depressing the alternate line manual transfer/lock pushbutton shall cause the alternate circuit to become or remain locked as the operating line circuit regardless of the status of either line. The alternate lock indicator shall become "STEADY ON" at that facility, and the primary failed shall become "STEADY ON" on the display panels at both facilities. The primary line shall be positively disabled. Depressing the same pushbutton again shall release

the lock on the alternate line, cause the alternate lock indicator to be "OFF", and cause the primary failed indicator to be "OFF." In all cases where the primary circuit is not failed, an automatic transfer (paragraph 3.3.1.4.1) to the primary line shall occur when the alternate circuit transfer is released. This feature shall be provided on a non-optional basis.

3.3.1.5 Manual circuit lock feature.- The LASS system shall be provided a manual transfer feature as described above. When either of the circuits is transferred manually, that circuit shall automatically be locked as the operating circuit. The visual indicator lamps shall be as stated in paragraph 3.3.1.4.2 when a circuit is transferred and locked. Only the facility that caused the locked circuit shall have the capability of releasing the lock. Depressing the manual transfer/lock pushbutton that caused the transfer and lock of the circuit shall release the lock on the circuit. Upon the release of a locked alternate line an automatic transfer to the primary line shall be performed by the LASS system if the primary circuit is in a non-failed condition. This feature shall be provided on a non-optional basis.

3.3.1.6 Display/control panel.- Panels shall be provided by TELCO at all facilities on which shall be mounted the line lock and the failed indicator lamps with associated manual transfer/lock pushbuttons and alarm cut-off pushbuttons as described herein. The panels herein shall be referred to as the display/control (D/C) panels. One(1) panel shall be provided at the ARTCC for each LASS system terminated therein. Additionally, one(1) panel shall be provided at the RCAG for each LASS system terminated therein. The local serving company shall provide a single unit which shall have provisions for the appearance of six(6) display/control (D/C) panels at all facilities. The dimensions of this unit shall be nominally 19" W x 3.5" H x 12" D. The Government will provide space in racks or wall mounts, as described in paragraph 3.1.2.1.2, to contain these units. The location(s) of the display/control (D/C) unit(s) shall be an option of the Government and will be specified in the order. Figure 4 is a drawing of a typical display/control (D/C) unit and D/C panel.

3.3.1.6.1 Manual controls.- The LASS system shall be provided with manual controls as described herein. The pushbuttons required for manual transfer and lock of circuits as described in paragraphs 3.3.1.4.2 and 3.3.1.5 shall be provided by the telephone company and shall be mounted in the display/control (D/C) panel. Additionally, the pushbuttons required for alarm cut-off as described in paragraph 3.3.1.6.3 shall be provided by the telephone company and shall be mounted in the display/control (D/C) panel. Status lamps as described in paragraph 3.3.1.6.2 shall be included. These pushbuttons shall be provided on a non-optional basis.

3.3.1.6.2 Status lamps.- The display/control (D/C) panel shall be provided four status lamps by the telephone company. The lamps shall normally indicate, when "STEADY ON", a failed line circuit (paragraph 3.3.1.3) or a locked line circuit (paragraph 3.3.1.5). One red indicator lamp combined with the alarm cut-off pushbutton shall be provided to indicate a failure

of the primary line. Another red indicator lamp with the alarm pushbutton to indicate a failure of the alternate line shall be provided. The red indicator lamps shall also indicate a line that is locked out of service by the manual transfer lock features. In all cases, a return to non-failed condition on the associated line circuit shall cause the red indicator lamp to be "OFF" unless the line is disabled by the lock feature. Additionally, the red indicator lamp associated with the alternate line shall be "FLASHING" when signalling on the voice communication channel (paragraph 3.3.1.9) and "STEADY ON" while voice communication is established between the two Government facilities. The red indicator lamp shall be "OFF" when the call is terminated as described in paragraph 3.3.1.9. The LASS system shall be provided with two(2) green indicator lamps combined with the transfer pushbutton to indicate the line circuitry that has been transferred and locked in service. One(1) green indicator lamp shall be provided for the primary line and another shall be provided for the alternate line. The associated indicator lamp shall be "STEADY ON" when a line is transferred and locked in service. The green indicator lamp shall be "OFF" when the transferred line is released. Chart 1 defines the status of the indicator lamp under varying conditions.

3.3.1.6.3 Alarm cut-off.- Two(2) non-locking pushbuttons combined with the red indicator lamps shall be provided to the LASS system and shall be provided on the display/control (D/C) panel. The pushbutton, herein called the alarm cut-off (ACO) pushbutton, when depressed shall cause the audible alarm described in paragraph 3.3.1.7 to be deactivated at that facility. The alarm cut-off (ACO) pushbutton shall in no manner affect the red indicator lamp associated with a failed circuit. The alarm cut-off (ACO) pushbutton associated with a line shall only be capable of deactivating an audible alarm caused by that unique line. This alarm cut-off (ACO) pushbutton shall be provided on a non-optional basis.

3.3.1.7 Audible alarm.- An audible alarm shall be provided the LASS system by the telephone company. At the option of the Government, a bell, buzzer, chime or set of dry contact shall be provided for audible alarm. The audible alarm shall indicate a failed line circuit in conjunction with the red indicator lamps in the LASS system. The time required for activation of the alarm shall be greater than 10 seconds but less than 15 seconds after a line transfer. The audible alarm shall remain activated until the failed line returns to normal or is manually deactivated at that facility. A feature shall be provided for the manual deactivation of the audible alarm of each line as described in paragraph 3.3.1.6.3. At the option of the Government, one(1) audible alarm shall be activated by one or more LASS systems. In all cases, the audible alarm can only be deactivated by the alarm cut-off pushbutton associated with the circuit which caused the alarm. This audible alarm feature shall be provided on a non-optional basis. Chart 1 defines the status of the audible alarm under varying conditions.

3.3.1.8 Test jacks.- The telephone company shall provide the Government with test jacks (Type 240C or equivalent) connected to each LASS system for

usage in maintenance functions of the complete (Filter to Filter) standby circuit at both the ARTCC and RCAG facilities. Test jacks shall be provided to the send circuit (Tj) in order that test signals may be applied thereto in a direction away from the facility only. Test jacks shall be provided to the receive circuit (Rj) in order that the standby circuit may be monitored in a direction toward the facility only. The LASS system shall automatically switch the standby line to the test jacks each time a line transfer is performed. The loop-around feature (paragraph 6.3) shall provide for total standby circuit check-out exclusive to the far-end LASS circuitry from the Tj and Rj jacks. Any insertion of the proper type plug into a test jack shall remove the pilot tone from the standby circuit and provide access to the complete circuit filter to filter. Provisions for mounting the test jacks will be provided by the Government as described in paragraph 3.1.2.1.2 and subparagraphs. In all cases, the location of the test jack will be an option of the Government.

3.3.1.9 Maintenance voice communication feature.- The telephone company shall provide voice communication capability on the alternate circuit between the ARTCC and the RCAG for use by the Government (See Figure 3). The voice communication capability on an alternate circuit may be referred to herein as the voice channel. Each facility shall be provided a locking key or a switch-hook hereafter called the transfer key. The transfer key shall provide for signalling or answering a call on the voice channel. The voice communication feature shall be disabled if the alternate circuit has been transferred to be the operating circuit. To initiate a call on the voice channel, operation of the transfer key at either facility shall cause a failure of the alternate line circuit. This failure shall cause visual and audible indications as described herein. Operation of the transfer key at the opposite facility shall establish a voice communication channel on the alarming circuit and terminate the circuit into the instrument (paragraph 3.3.2.2). The alarm cut-off pushbutton shall be used to silence the audible alarm. The red indicator lamp associated with the alternate line shall be "STEADY ON". Optional standard telephone instruments shall be provided to the LASS system for use by the Government on the voice channel between the facilities. Normally, the voice communication capability shall be terminated by the operation of both the transfer keys in any sequence. In those cases when the primary line fails while the secondary line is being utilized for voice communication, the automatic transfer feature shall automatically pre-empt the alternate line and normal system operation shall proceed thereon except when that secondary line is locked-out at both facilities. Termination of the voice communications capability shall cause the failure alarm lamp of the alternate line circuit being used for the voice channel to be "OFF". Normally, the Government will only require one(1) voice channel between any two(2) facilities although optionally additional voice channels may be ordered. The quantity of voice communication channels and the facilities connected will be specified in the order. The type of instrument used at any facility shall be an option of the Government and shall be specified in the order. The Government will provide space for the mounting of the voice communication equipment as defined in paragraph 3.1.2.1.2.

3.3.2 Optional features.- The telephone company shall make available, as an option to the Government, the following features, functions and equipment when specified in the order.

Feature/Function	Paragraph
Remote Display/Control Panel	3.3.2.1
Remote Alarm Panel	3.3.2.1.1
Remote Monitoring Panel	3.3.2.1.2
Telephone Instruments	3.3.2.2
Headset	3.3.2.2.1
Handset	3.3.2.2.2
Telephone Console	3.3.2.3

3.3.2.1 Remote display/control panel.- Reserved.

3.3.2.1.1 Remote alarm panel.- Intentionally left blank.

3.3.2.1.2 Remote monitoring panel.- Intentionally left blank.

3.3.2.2 Telephone instruments.- Each facility shall be provided telephone instruments for usage on the voice channel as described in paragraph 3.3.1.9. The Government will have the option of selecting the type of telephone instrument used on the voice channel at any facility. The type and quantity of telephone instruments required at the facilities will be specified in the order.

3.3.2.2.1 Headset.- Western Electric Type 52 series, the Plantronics Model MS-50 (WECO Type KS-19796), Plantronics Starset Model Type MS-80 (WECO Type KS-20558) or the equivalent shall be available as specified in the order. Equivalent headsets shall comply with FAA Specification FAA-E-2486.

Each headset shall be equipped with a double tip-ring-sleeve plug, PTT switch (locking or non-locking as specified) and retractile cord whose lengths shall be a standard as specified in the order. Standard lengths shall be 6', 9' and 25' for the Type 52 and 10', 15' and 25' for MS-50 or MS-80.

3.3.2.2.2 Handset.- Western Electric Type G5 series handsets shall be available as specified in the order. Each handset shall be equipped with a PTT switch, double tip-ring-sleeve plug, a retractile cord of standard length as specified in the order and a hanger. Standard lengths shall be 4', 9', 13' and 25'.

3.3.2.2.3 Telephone console.- The telephone company shall make available as an option to the Government various types of telephone consoles (Call Directors) to terminate the voice channels at those facilities which require large quantities of LASS systems. The telephone console (Call

Director) may be console mounted or flush mounted as an option of the Government. The telephone console shall be provided with the standard WECO key modules for optional termination of one(1) to fifty(50) LASS system voice channels. The required quantity of keys will be specified in the order and coordinated with the local telephone company in order to determine the telephone console type to be used. The telephone console shall be equipped with a switchhook and handset (paragraph 3.3.2.2.2). In all cases, it will be an option of the Government as to usage or non-usage of the telephone console. The Government will specify the quantity of, type of and the required equipment associated with the telephone console(s) required at any Government facility.

3.3.2.4 Instruction material.- The local TELCO organization shall provide the Government on an optional basis copies of instruction books pertaining to the LASS system. The instruction books shall include the basic theory of operation, required operational procedures, and test procedures for the LASS system. Included shall be descriptive drawings and block diagrams of the LASS system. The books shall describe the procedures required for operation of all basic features specified herein as essential features to the LASS system. These books will be provided to the Government by TELCO when requests are made to the local serving company.

3.4 Finishes.- All display/control panels shall be coated with a primer and baked enamel. The quality of the enamel and method of application shall provide a coating that will resist abrasives, chemicals, solvents, alkalies and be weather resistant. In all cases, the color of the finishes applied to the panels and associated LASS system equipment mounted in the FAA equipment room(s) shall conform completely to FAA-STD-001a.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Acceptance.- Upon completion of the installation an FAA representative delegated by the Airway Facilities Division Chief of the region accompanied by a representative of the local telephone company will make a joint inspection. They shall certify that the features required by the order have been provided and operate satisfactorily. They will note all LASS system deficiencies where required features are not provided or functioning as described in this specification.

4.1.1 Conditional acceptance.- All deficiencies that are found during the joint acceptance inspection will be recorded in writing by the FAA representative along with the action required to correct the deficiencies. A written statement of the deficiencies and the corresponding corrective action required will be presented to the local TELCO representative. TELCO shall present the FAA representative an estimate of the amount of time required to perform the necessary corrective action needed to remedy the deficient condition(s) found in the system. It will be the responsibility of the FAA representative to determine if the deficiencies noted warrant non-acceptance of the system by FAA. Acceptance of the system by FAA with the noted deficiencies will constitute a conditional acceptance. This conditional acceptance will be effective until such time as the required corrective action has been performed and all deficiencies removed. It will be the responsibility of the FAA (Airway Facilities Division) within the region to maintain follow-up contacts with TELCO in order to

assure a timely removal of the deficiencies in order to conduct the final inspection (paragraph 4.1.2).

4.1.2 Final acceptance.- The Government will make final acceptance of the system upon satisfactory demonstration that the system performs in accordance with the order and this specification with no deficiencies noted. Final acceptance shall be made in writing to the local telephone company.

5. PREPARATION FOR DELIVERY.- Not applicable.

6. NOTES

6.1 Note on information items.- The contents of this Section 6 are only for information and are not a part of the requirements of this specification. They are not contract requirements nor binding on either the Government or the local telephone company.

6.2 Objective.- Intentionally left blank.

6.3 Special provisions.- The electronically controlled loop-around arrangement shall be provided on the line circuits as a maintenance function for both TELCO and FAA usage when requested by the Government. TELCO shall provide access to and usage of the loop-around arrangement by the Government. TELCO shall provide all of the required information concerning the necessary test equipment, operating procedures and maintenance functions of the loop-around arrangement. As this loop-around is not a required feature of the LASS system, it will not be ordered by the Government. However, when requested, this feature shall be provided by the telephone company and there shall be no charge for its usage. Additionally, space will be provided for mounting the loop-around controlling equipment when the provision is requested.

6.4 Development items.- The following items are proposed development items which are being studied as to feasibility by the agency.

6.4.1 Remote monitoring panel.- A remote panel is being considered for the LASS system which will display with indicator lamps the status of all line circuits terminated in a large facility. The panel will not provide for manual transfer/lock of the line circuits. Each line circuit will have a red indicator lamp to indicate a failed line circuit. The panel may contain up to 300 indicator lamps and have dimensions similar to those in the rack mount display/control panel. The indicator lamps would be parallel to a corresponding lamp on the display/control panel.

6.4.2 Remote alarm panel.- A remote panel is being considered for the LASS system that will provide a common audible and visual alarm for any failure of any line circuit terminated in the facility. This panel shall consist of one(1) indicator lamp and an audible alarm. All failures detected by the LASS system and displayed on the display/control panel would cause the visual display and the audible alarm to be active.

6.4.3 Mini-Display/Control Panel.- Both the Government and concerned industry offices are considering the development of miniaturized D/C panels (par. 3.3.1.6). The mini-D/C panel will have features and functions equivalent to those defined in paragraph 3.3.2.1. However, the indicators and push-button switches utilized will have dimensions which are smaller in order that larger qualities of each may be mounted in the space provided at a remote position.

6.4.4 Remote Display/Control Panel-The local telephone company shall provide, on an optional basis to the Government, a remote display control panel. The remote display panel shall have identical components to those mounted on the Display/Control panel described in paragraph 3.3.1.6. Additionally the remote D/C panels shall be multiple wired to those installed in the equipment room. The push-button switches shall perform as described in paragraph 3.3.1.6.1.The indicator lamps shall perform as described in paragraph 3.3.1.6.2. The audible alarm shall be provided to the remote D/C panel as described in paragraph 3.3.1.7 however an additional locking key shall be provided to disable the audible alarm circuit to the remote D/C panel. Placing the master alarm disable switch to the active position shall cause only the audible alarms associated with a line failure to be unobservable at the remote position. Space for mounting the remote D/C panel will be provided as defined in paragraph 3.1.2.1.2. Normally, this panel will be located at the SMMC in the ARTCC. The location of the remote D/C panel will be an option of the Government and will be specified in the order.

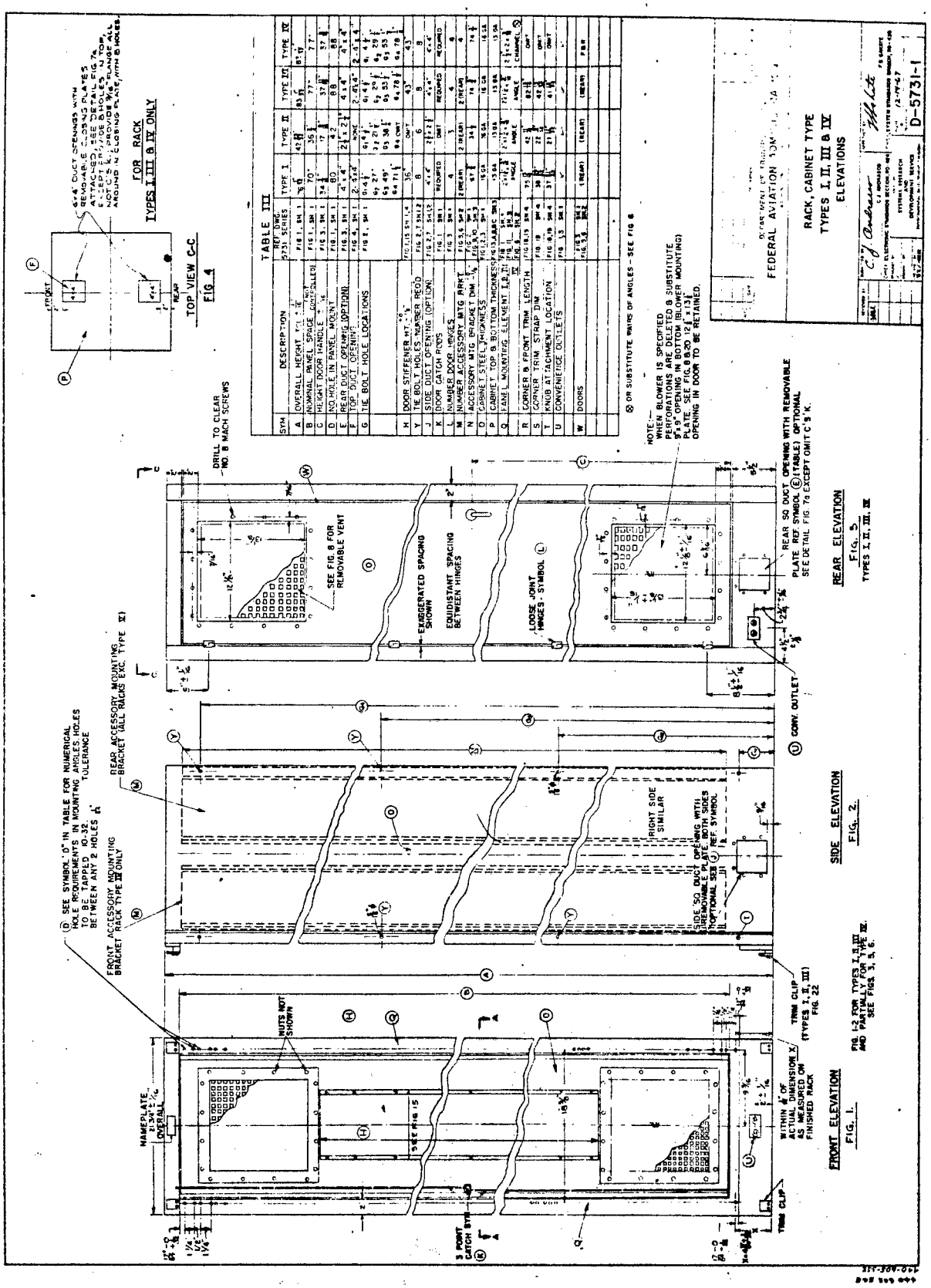
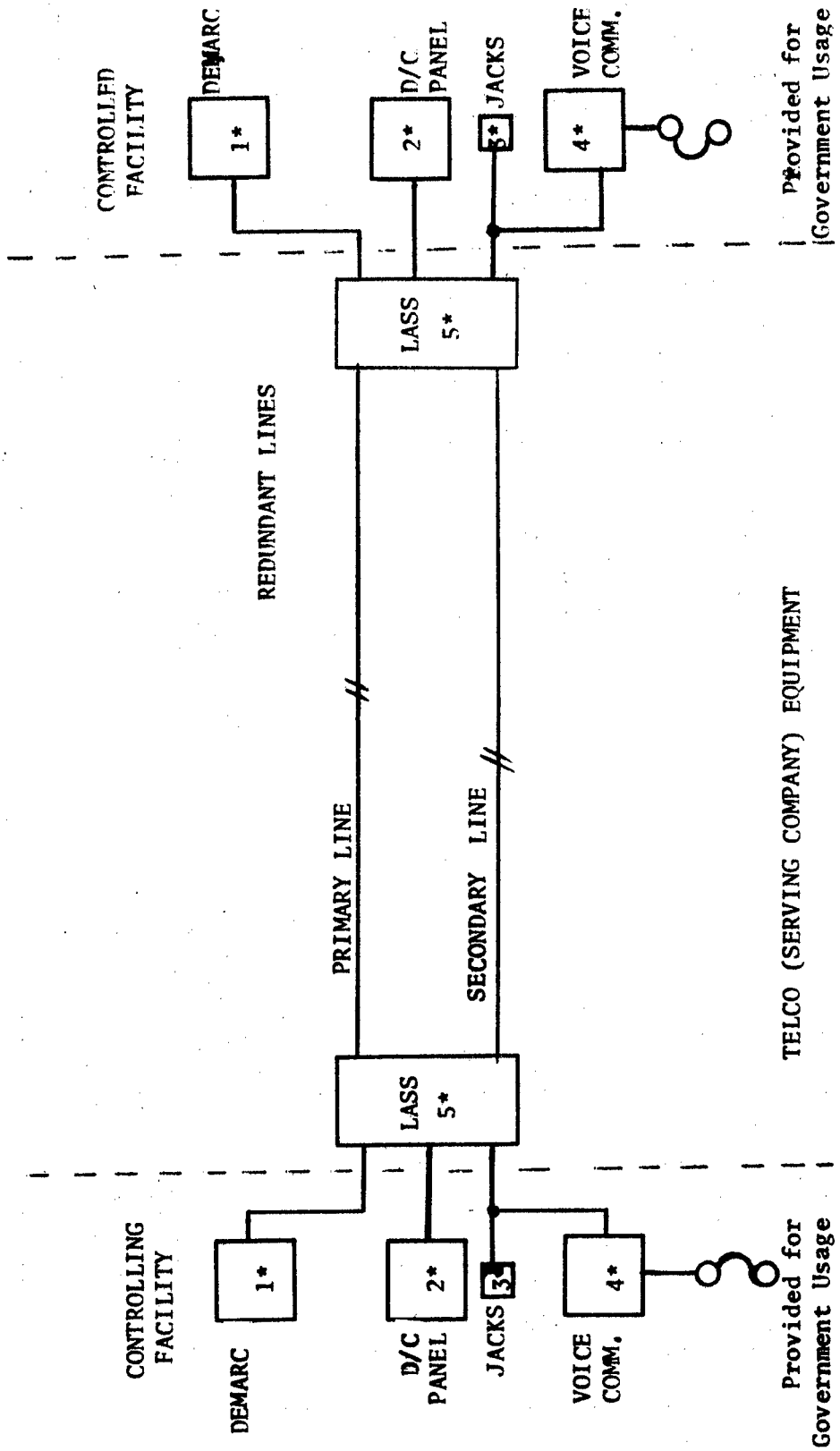


TABLE III
RACK, CABINET TYPE
TYPES I, II, III & IV
ELEVATIONS
D-5731-1
FEDERAL AVIATION
TOP VIEW C-C
FIG 4
FOR RACK
TYPES I III & IV ONLY
FRONT ELEVATION
FIG. 1.
SIDE ELEVATION
FIG. 2.
REAR ELEVATION
FIG. 3
TYPES I, II, III, IV
NOTE:—
WHEN BLOWER IS SPECIFIED
PERFORMATIONS ARE DELETED & SUBSTITUTE
9"x9" OPENING IN BOTTOM (BLOWER MOUNTING)
PLATE. SEE FIG. 8 & 20 12" x 13"
OPENING IN DOOR TO BE RETAINED.
DRILL TO CLEAR NO. 8 MACH SCREWS
SEE FIG. 8 FOR REMOVABLE VENT
EXAGGERATED SPACING SHOWN
EQUIDISTANT SPACING BETWEEN HINGES
LOOSE JOINT HINGES - SYMBOL (L)
REAR SQ DUCT OPENING WITH REMOVABLE PLATE REF. SYMBOL (E) (TABLE) OPTIONAL
SEE DETAIL FIG 7a EXCEPT OMIT C'S'K.
CONV. OUTLET
REAR ACCESSORY MOUNTING BRACKET TALL RACKS EXC. TYPE II
FRONT ACCESSORY MOUNTING BRACKET RACK TYPE III ONLY
SIDE SQ DUCT OPENING WITH REMOVABLE PLATE REF. SYMBOL (J) OPTIONAL SEE DETAIL FIG 7a
RIGHT SIDE SIMILAR
NAMEPLATE
NUTS NOT SHOWN
TRIM CLIP (TYPES I, II, III) FIG. 22
TRIM CLIP
5 POINT CATCH SYS
SEE FIG 15
WITHIN ½" OF ACTUAL DIMENSION X AS MEASURED ON FINISHED RACK
FIG 1-2 FOR TYPES I, II, III AND PARTIALLY FOR TYPE IV. SEE FIGS. 3, 5, 6.

Figure 1



LASS SYSTEM *See figure 3

FIGURE 2

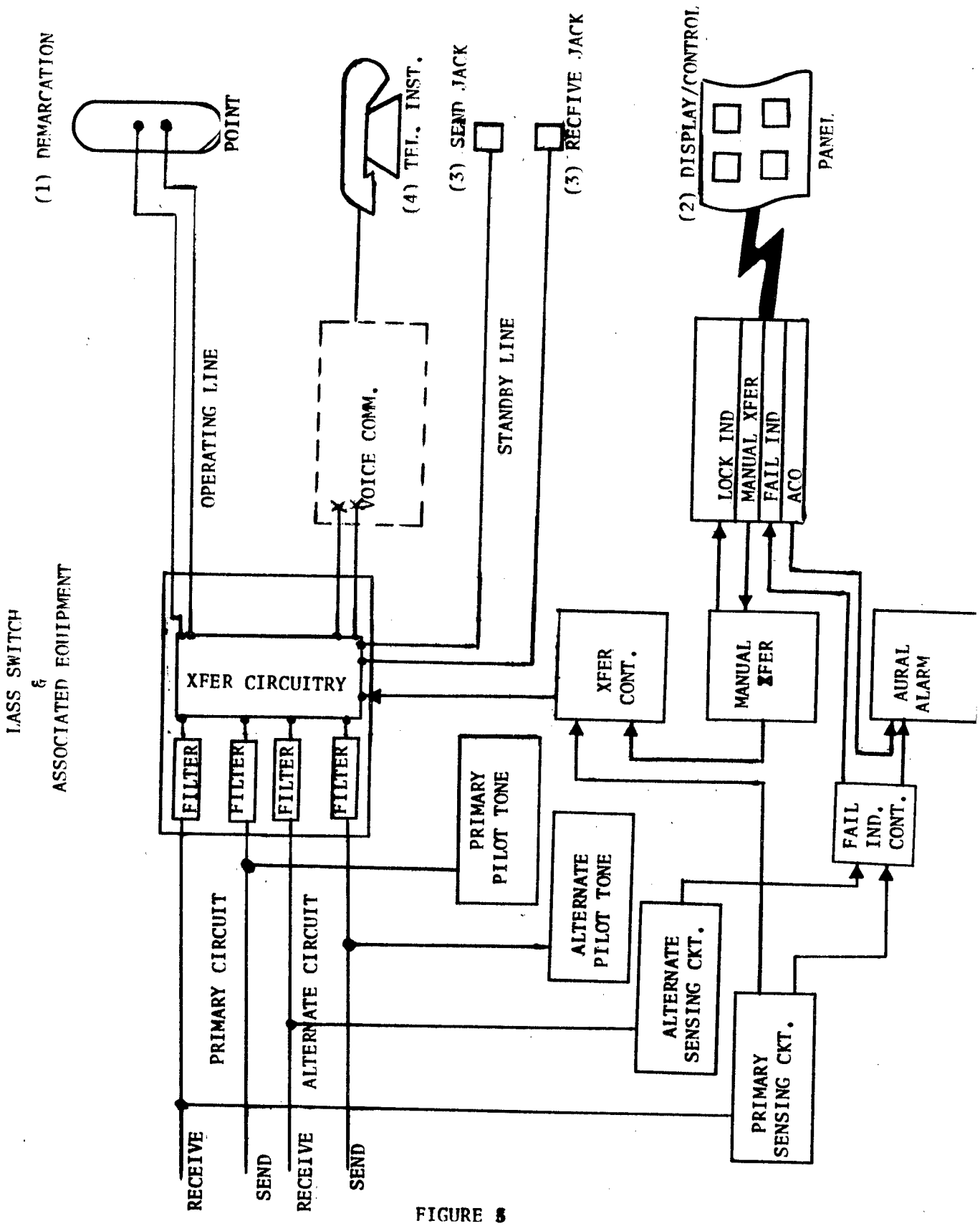
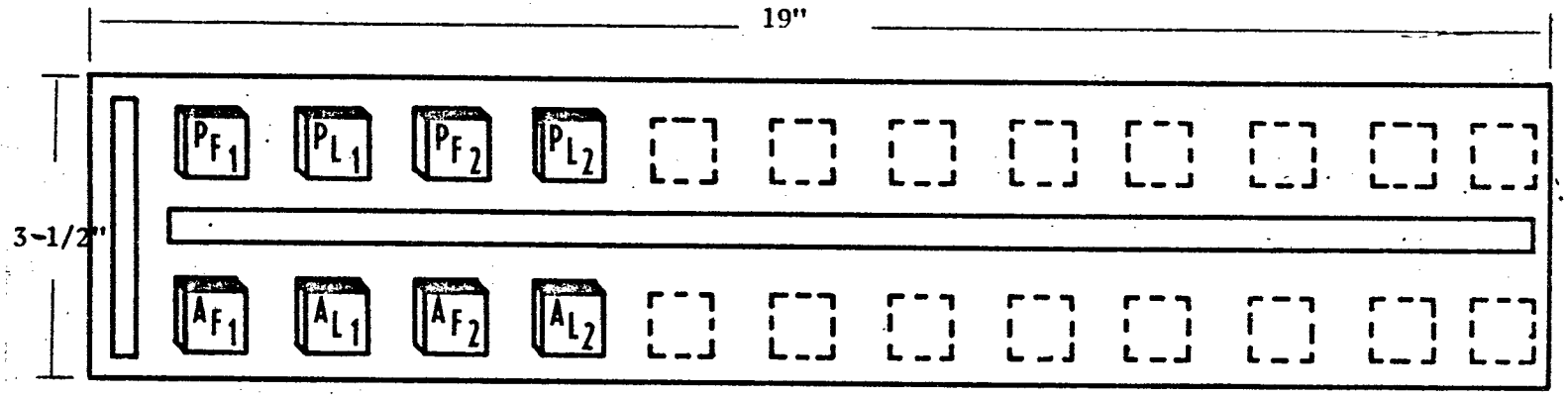
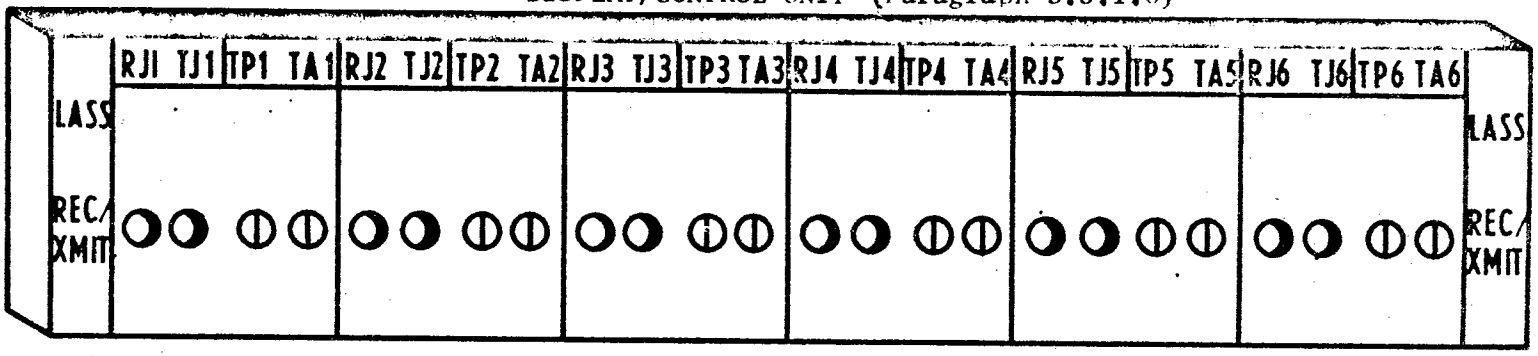

(1) DEMARCATION POINT
(4) TEL. INST.
(3) SEND JACK
(3) RECEIVE JACK
(2) DISPLAY/CONTROL PANEL
OPERATING LINE
VOICE COMM.
STANDBY LINE
LOCK IND
MANUAL XFER
FAIL IND
ACO
XFER CIRCUITRY
XFER CONT.
MANUAL XFER
AURAL ALARM
FILTER
FILTER
FILTER
FILTER
PRIMARY PILOT TONE
ALTERNATE PILOT TONE
FAIL IND. CONT.
ALTERNATE SENSING CKT.
PRIMARY SENSING CKT.
PRIMARY CIRCUIT
ALTERNATE CIRCUIT
RECEIVE
SEND
RECEIVE
SEND
LASS SWITCH
&
ASSOCIATED EQUIPMENT

FIGURE 5



DISPLAY/CONTROL UNIT (Paragraph 3.3.1.6)



TEST JACKS AND LINE STATUS LAMPS

NOTE: This drawing is descriptive and is not intended to be definitive (Not to scale)

PF = Primary Failure Lamp combined with Alarm Cut Off (Paragraph 3.3.1.6.2)
AF = Alternate Failure Lamp combined with Alarm Cut Off (Paragraph 3.3.1.6.2)
PL = Primary Lock indicator and pushbutton (Paragraph 3.3.1.6.2)
AL = Alternate Lock indicator and pushbutton (Paragraph 3.3.1.6.2)
RJ = Receive Test Jack (Paragraph 3.3.1.8)
TJ = Send Test Jack (Paragraph 3.3.1.8)

Figure 4

Display/Control Panel
Status Lamp and Alarm Condition

Indicator/ Condition	Primary Fail (Red)	Primary Lock (Green)	Alternate Fail (Red)	Alternate Lock (Green)	Alarm
Normal	OFF	OFF	OFF	OFF	OFF
Primary FAILED	ON/	OFF	OFF	OFF	ON*/
Alternate FAILED	OFF	OFF	ON/	OFF	ON*/
Primary TRANSFER	OFF	ON	ON/	OFF	ON*/
Alternate TRANSFER	ON/	OFF	OFF	ON	ON*/
Voice Chan. RING	OFF	OFF	ON/	OFF	ON*/
Voice Chan. COMM	OFF	OFF	ON/	OFF	ON*/
Both FAILED	ON/	OFF	ON/	OFF	ON*/

/These lamp and audible indications are not present at the controlled end (RCAG) if action is initiated toward the controlling end (ARTCC)

*Deactivated by the alarm cut-off pushbutton.

Chart 1

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I N D E X